SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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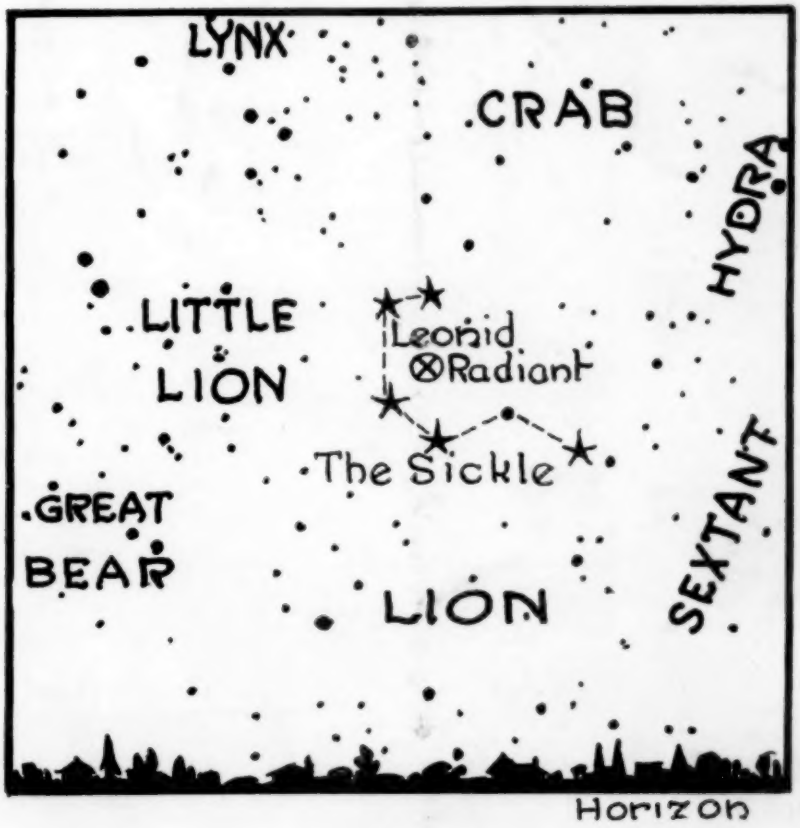

WATCH FOR THE NOVEMBER METEORS!

Your eyes are all the optical aid that you need

(*See page* 284)

Vol. XIV *No. 396*

How to Observe Leonid Meteors

Astronomy

Next Wednesday night, November 14, is the night when amateur star-gazers may help the professional astronomers by staying up late and watching for meteors. After midnight will come the greatest display of the Leonid shower, when dozens of meteors, or "shooting stars," will be seen to radiate from the constellation of Leo, the lion.

The map on the cover shows the part of the sky from which the meteors seem to come, the way it will appear if you look to the northeast at midnight. At that hour you will not see all the faint stars shown, but the sickle of Leo will be easily seen if it is clear. As the night grows later, this region of the sky will rise higher, until dawn, when it will be in the south. As it rises higher, the fainter stars will come into view, and if the sky is very clear and one is away from the lights of a city, then practically all the stars shown will be visible.

Meteor hunting is a game that requires late hours. There is no use hunting for the Leonids before midnight, while the greatest display comes about 3:00 to 4:00 a. m. The nights of the 14th and 15th both bring them, but the greater number can be seen on the night of the 14th; that is, the early morning of the 15th.

If you want to hunt meteors, then, get out after midnight where you have a clear view of the northeastern horizon. Look for the stars shown on the map. Have a pencil and paper handy so that you can take down notes, also a watch set as nearly to the correct time as you can get it. A flashlight will be helpful, but as the flashing of it on and off against the white paper would make your eyes less sensitive to the meteors, it would be a good idea to cover it with several thicknesses of tissue paper, held with a rubber band.

Now start watching. If two people can watch together, so much the better, then one can be sure to be watching all the time. Identify the stars on the sky with those of the map. Whenever you see a meteor try to mark its path on the map. Even if you can't mark it on the map, make a record of it. It is not necessary to note the time of every individual meteor, unless it is unusually bright, but count the number every half hour. It would be well to mark off your paper "12:00 to 12:30, 12:30 to 1:00, 1:00 to 1:30," etc., and then mark the meteors seen during each of these periods with a tick.

Observe and note the colors of the meteors and their brightness. You can do this by referring them to different stars on the map, for astronomers know the brightness of all of these. Notice whether they simply flash across the sky and then are gone, or whether they leave trails behind. Notice whether there are any fire-balls—meteors that are unusually brilliant.

As for the numbers. Astronomers never know just how many meteors will appear in a shower until they actually see it. Fifteen an hour is pretty good, while ten an hour should be seen easily.

After you have this record, don't forget that the astronomers want to see it. Dr. Charles P. Olivier, at the Flower Observatory of the University of Pennsylvania, Upper Darby, Pa., is president of the American Meteor Society, and operates the chief clearing house for meteor observations. Send him your records. The American Meteor Society is a group of amateur astronomers, who watch meteors in November as well as at other times of the year, and so aid scientists in studying these visitors from outer space. If you prefer, send in your reports to the SCIENCE NEWS-LETTER and we shall forward them to Professor Olivier.

In case you are reticent about tearing this page out of your SCIENCE NEWS-LETTER, let us know when you send in your report, and as long as our supply lasts, we will send you a duplicate copy with our compliments.

Science News-Letter, November 10, 1928

In This Issue—

SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science. *Medical Progress* is merged into the SCIENCE NEWS-LETTER.

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INTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable typography and the most convenient arrangement.

The *clippability, indexing,* and *automatic dating* of each article are unique features.

This is a *separable magazine.* Each original article can be clipped or torn out without losing or damaging another important article on the other side. These original articles are backed by reprinted quotations or excerpts, short one-sentence items, advertisements, and other material not likely to be clipped and preserved.

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Greeks Used Modern Swimming Stroke

Archæology—Athletics

By Jane Stafford

They swam the "crawl" 2,000 years ago in Greece. The beautiful maidens and youths of that country practised the same strokes in their elaborate marble pools that American girls and boys are learning and using in tiled pools today.

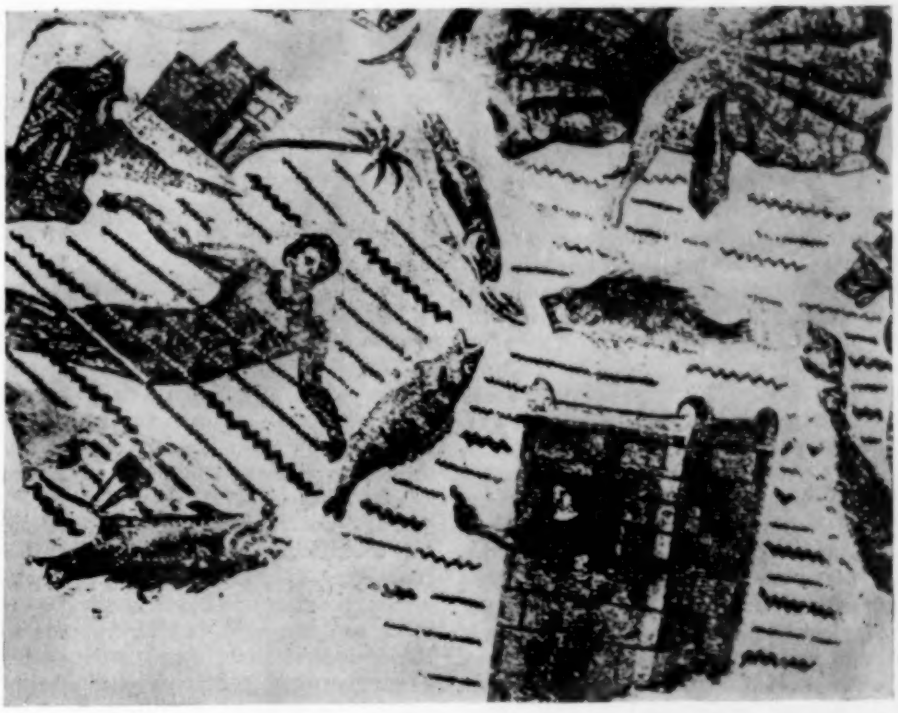
Ancient Greek heroes, both legendary and actual, Egyptian soldiers of the time of Rameses II, Assyrians who lived in the biblical city of Nineveh, Greek and Roman bathing beauties of the earliest times and even Venus herself all used a swimming stroke almost identical with the overhand stroke popular today. The double crawl with trudgeon or scissors kick, only recently imported from Australia, was known 3,000 years ago and was used exclusively by all the peoples of ancient times.

In fact the symbol for swimming in Egyptian picture-writing of that time was a man's head and arms in the position of an overhand stroke. Those who were not good swimmers had inflated skins, the ancient equivalent of inner tubes or water-wings, to help them along.

Even the modern flapper's one-piece bathing suit has, for ease of movement and extreme of style, nothing on the costume of the ancient Grecian ladies, who tucked their permanent waves into becoming caps and plunged right into their pools altogether free from hampering suits of any kind.

When Leander, famous hero of Greek mythology, swam the Hellespont, hundreds of years before the birth of Christ, he used practically the same stroke that is being used to break world's swimming records today. This Greek youth defied the gods by courting one of their priestesses, Hero by name. For punishment she was imprisoned in a lonely tower on the other side of the Dardenelles, and every night her faithful Leander swam the treacherous strait to be with her.

Ancient literature which tells the story of these two lovers does not mention how Leander fought his way through the stormy waters that lay between him and his love, but Professor James E. Dunlap, of the University of Michigan, has discovered pictures and mosaics showing Leander swimming with what is undeniably an overhand stroke very similar to the modern crawl, even to the trudgeon kick of the legs.



LEANDER swimming the Hellespont as depicted in an old African mosaic

One picture showing Leander swimming was taken from the mosaic decoration of a great public bath at Henchir-Thina, the ancient Thenae, in the province of Byzacium in northern Africa. This bath, discovered and excavated in 1904, dates from the end of the second century of our era, reports Professor Dunlap in *Art and Archaeology*. Under the great central dome of the *frigidarium*, which was the room containing the cold water pool, is the mosaic, circular in shape, seven and one-half meters in diameter.

This mosaic depicts various marine groups. In the lower left-hand corner among the fish and waves, Leander swims toward the right, where Hero is leaning out of her tower with a lamp to light him on his way. On the shore behind him is the squat tower of Abydos, his home, and sitting near it is the disconsolate old king. Leander is undoubtedly in the position of one swimming an overhand stroke, declares Professor Dunlap. The extended left arm has begun the downward stroke, while the right, trailing far behind, is ready to be lifted out of the water. Although the feet are destroyed, the legs show clearly the position that the modern swimmer uses in the crawl. Further indication that Leander used a typical double crawl is seen on continued examination of the picture, which shows Leander's head and shoulders lifted well out of the water with his body in an oblique, somewhat curved position, identical with that taken in the side-to-side roll of the double crawl, as we know it today.

Another picture of Hero and Leander was found in Pompeii. The essential features are the same, reports Professor Dunlap. Leander is swimming toward the right in the same manner as in the north African mosaic.

While Leander was a purely legendary hero and no one really knows exactly how he swam or if he swam at all, the people living at the time these mosaics and pictures were made must have used an overhand stroke, is Professor Dunlap's contention. In practically every picture, whether a mosaic, a frieze or a painting on pottery, swimming figures are shown in this characteristic pose.

A famous vase by Andocides, which is now in the Louvre at Paris, is decorated with a scene from a women's bathing establishment. That this was an indoor pool is evident from the pillar, giving support to the roof, and from the bathing caps hanging on the wall. These caps are the only trace of bathing costume worn. (*Turn to next page*)

Greeks Used Modern Swimming Strokes—*Continued*

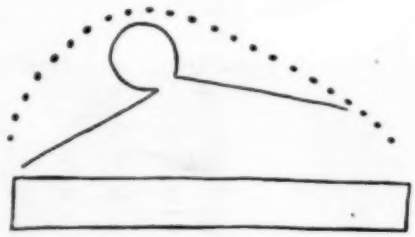
Two of the women are on the side of the pool, one just leaving, the other waiting to enter the water. A third is shown swimming. The artist has put two fish into the picture, to make it clear that she is swimming, and not reclining on dry land. She is quite evidently using an overhand stroke. Her right arm is extended above her head, while the left is back, palm turned down at the completion of the pull, or ready to lift from the water for the beginning of the next stroke. The swimmer is on her side, her face above the surface of the water and turned toward her companion who seems to be calling back to her. The feet of the swimmer are close together, toes pointing downward, with the knees slightly bent. On the diving platform the fourth woman stands, just ready to plunge into the pool.

Roman women also practised the art of swimming, and they, too, judging from pictures that have been found, used an overhand stroke. From a wall painting at Herculaneum comes a picture of a swimming figure that is so clear in outline and so free from irrelevant detail that it serves as an excellent standard for comparison of artistic representations of this kind, according to Professor Dunlap.

The figure is a woman who is on her left side, swimming toward the right, but with her face toward the spectator. Unlike swimming figures in Egyptian and Assyrian pictures, this swimmer's body is shown in an oblique position, gently and gracefully curved, with the head nearly vertical and held well out of the water. Her left arm, stretched far forward, is ready to begin the downward and backward pull, while the right arm is extended far back to the end of the stroke. Her feet are apart, with the right leg forward and a little lower in the water than the left, which is bent back and flexed slightly at the knee. Without doubt the artist intended to portray an overhand stroke with accompanying scissors stroke of the legs, such as many women swimmers of today are using.

"So far as the Romans are concerned, the archæological evidence for the common employment of the overhand stroke is corroborated by literary references," observes Professor Dunlap.

Artistic convention may have colored the evidence from these ancient mosaics, paintings and reliefs, suggests Professor Dunlap. "No artist, unless seeking a reputation as a caricaturist, would think of depicting Leander, for example, in the attitude of a leaping frog. If he did so, the pitiful hero of the tale would receive nothing but ridicule." Even in some scenes which are intentionally amusing, where a bit of the grotesque would be quite in keeping, the swimmers are shown using the graceful overhand style.



EGYPTIAN SYMBOL for the word "swim"

The remarkable similarity among the swimming figures and the fact that nymphs reclining on the backs of sea beasts are shown in the swimming position lend further support to the idea that the Roman artists used a conventional pose for their swimmers.

This method of swimming was not confined to Greece and Rome alone. The Egyptians and other peoples who lived along the banks of the Nile were also swimmers. In fact the Egyptians have left records of this achievement. A nobleman of the Middle Kingdom (2160 to 1780 B. C.) proudly recorded the fact that his children took their swimming lessons with the children of the king. Unfortunately he does not mention what strokes they learned, possibly because there was only one way of swimming known at that time.

Reliefs discovered at the ancient Biblical city of Nineveh shed light on the swimming practices of the Assyrians of an early period. Apparently the Assyrians were not such proficient swimmers as the Egyptians, for whenever possible, they used inflated skins to buoy them up in the water, just as small children and inexperienced adults use waterwings or inner tubes today. In the army these skins were carried as part of the regular equipment of Assyrian soldiers, just as modern soldiers carry gas masks. They could, of coure, be folded up and would take very little room in the pack.

From Nineveh comes a frieze showing a group of soldiers crossing the Euphrates river. In this group we have, from left to right, first, a soldier kneeling on the bank, blowing up a skin, before entering the water. Next is a soldier who has already taken to the water. He is supported on one of these skins, which he seems to blow into as he goes along. He is using his legs and one free arm to propel himelf. Ahead of him one more accomplished soldier swims without any life preserver to aid him. He is pushing vigorously for the farther shore, using an overhand stroke. His body is flat in the water, the line of the shoulders horizontal, with the head raised above the surface and facing toward the shore ahead of him. The arms are not in so characteristic a position as in some of the other pictures, but close examination shows that the palm of one hand is turned up, that of the other being turned down. The two arms are obviously not employed similarly, as in the breast stroke, but in different movements, such as are natural to an overhand style of swimming. Probably the right hand, palm upturned, is making the first part of the backward and downward stroke, while the left has just finished a stroke, or is being lifted from the water to begin the next one. The legs of this man and of the one swimming with the inflated skin are slightly separated in a vertical direction, with the toes turned downward. Apparently these soldiers abandoned their clothing to facilitate their progress through the water.

"The most striking peculiarity of the Assyrian overhand stroke, as represented in the reliefs, was that the swimmer did not roll from side to side as he used first one arm and then the other, but maintained his body in a constant horizontal position," points out Professor Dunlap. As this position, if held as rigidly as the reliefs suggest, would make swimming very difficult, it seems reasonable to assume that the Assyrian swimmers did turn their bodies somewhat in the water, even if they did not do so on stone.

A number of other mosaics were studied by Professor Dunlap. Some of these depict life along the Nile, some are fishing and swimming scenes, one shows cupids at play. In all cases, the swimming figures, whether human, divine or semi-divine, are shown using some sort of overhand stroke. Whenever the figure is clearly seen, the stroke is found to be almost identical with the now popular crawl, or at least with the less vigorous but equally "modern" side-stroke used in pools all over America and Europe.

Einstein Upheld At Optical Meeting

Physics

Following are reports of some of the interesting papers presented at the thirteenth annual meeting of the Optical Society of America at the U. S. Bureau of Standards, November 1 to 3. The meeting was known as the Michelson meeting, in honor of Prof. A. A. Michelson, "Dean of American Optics."

Although the theory of relativity has been claimed as dispensing with the need of the old-fashioned ether, permeating all space, and through which light, X-rays, radio waves, etc., are supposed to be transmitted, it does no such thing. This was the assertion made at the meeting of the Optical Society of America by Dr. Paul R. Heyl, physicist of the U. S. Bureau of Standards.

Speaking by invitation on present-day views of the nature of light, Dr. Heyl told how Einstein had suggested that gravitation could be explained, not as a real force, but as a manifestation of "curved space." An ant walking on a sheet of paper might not be able to tell whether the paper was curved or flat, and similarly our space might be curved in some unknown way without our knowing it. Since this would dispense with the need of believing in the ether as a means of transmitting gravitational force, it has been stated that the theory of relativity has done away with the ether.

"If relativity ignores the ether, does it not introduce what is to all intents and purposes its equivalent?" said Dr. Heyl. "The ether was supposed to be a medium filling all space that otherwise would be empty. Einstein supposes space itself to be enough of an entity to have a curvature, and to be 'empty' only where and when it is flat. But if space can be bent and straighten out again, why can it not repeat this process with sufficient rapidity to be called a vibration? And what difference does it make whether it is space itself that vibrates, or something that fills space? Back in every one of our heads is the idea that there is something which philosophers call a 'thing-in-itself' which is responsible for our sensations of light and electricity; and whether we spell it E-T-H-E-R or S-P-A-C-E, what does it matter?"

Einstein's theory of relativity still stands. The Michelson-Morley experiment, which many years ago failed to show an expected motion of the earth through the ether of space, and led to the relativity theory as an explanation, still fails to show any such motion. At the meeting Prof. A. A. Michelson, physicist of the University of Chicago and Nobel prize-winner, announced the final results of a repetition of his classic experiment.

THE FREDERIC IVES MEDAL of the Optical Society of America, founded by Dr. Herbert E. Ives in honor of his father. It will be awarded biennially by the Society "for distinguished work in optics"

Working at the Mt. Wilson Observatory in Pasadena with much improved apparatus, capable of detecting a motion as much as 2 per cent. of that expected, none was found. The very slight effect found was less than that to be expected by experimental error and not more than a tenth of what he found before.

Physicists hail this announcement as showing that Prof. Dayton C. Miller, of the Case School of Applied Science in Cleveland, was mistaken in supposing a few years ago that he had found such an effect, though smaller than originally expected. So far, however, they are unable to explain the source of Prof. Miller's error.

Cathode Rays for Laboratory

The wonder-working cathode rays, first obtained in large quantities in the open air two years ago by Dr. W. D. Coolidge, of the General Electric Company's research laboratory, are now at the disposal of any well-equipped research institution. The effects of the rays on all sorts of living and mineral matter can now be studied.

This is possible with a new form of the tube, simpler than an X-ray tube, and hardly more complicated than an electric light bulb, which has been perfected by Dr. C. M. Slack, of the Research Department of the Westinghouse Lamp Company, at Bloomfield, N. J.

Cathode rays were first studied as they were produced inside glass tubes made by the English scientist, Sir William Crookes. Then, in 1894, a German, Prof. P. Lenard, first succeeded in getting them in feeble quantities in the air. Dr. Coolidge, in 1926, invented a tube in which they were obtained in large quantities in the open air.

The rays consist of speeding electrons, the "atoms" of an electric current, and of which the atoms of matter are supposed to be built. In the Coolidge cathode ray tube they are produced by a glowing electric light filament, and given their great velocity by the application of an electric potential of several hundred thousand volts. This is sufficient to drive them through a thin nickel window at the end of the tube, where they cause the air to glow and produce other curious effects.

Dr. Slack's improved tube dispenses with the nickel window and uses a bubble of glass, but so strong is it that the pressure of the air on the outside is not sufficient to break it, and destroy the essential vacuum within. Some of these windows are only one five-thousandth of an inch thick and an inch in diameter.

They are made by drawing in a bubble of molten glass on the end of the glass tube, and then allowing it to freeze. Thus it automatically assumes the shape so that the air pressure afterwards is the same as that during its formation, and it will stand surprisingly high pressures. The glass is so thin that the electrons, or cathode rays, can sneak through the spaces between (*Turn to next page*)

Optical Society Meeting—*Continued*

the glass atoms, even though these spaces are not large enough for the air atoms to squeeze through in the other direction.

"Portrait" of Spectrum Shown

A "portrait" of the rainbow-like spectrum of the sun, painted by a prominent artist, was one of the features of the meeting.

The painting is the work of Charles Bittinger, of Boston, and was made in one of the laboratories at the Bureau. With the assistance of Dr. Irwin G. Priest and other scientists of the Bureau, he was able to select colors that most accurately represent the actual spectrum. The spectrum is of the "normal" type, obtained with a grating consisting of thousands of fine lines scratched on a polished metal surface. Instead of a grating a glass prism is often used to form a spectrum.

Jupiter Rotates on Movie Screen

Scientists attending the meeting paused from listening to papers on research to see a movie. They applauded it with as much vigor as any screen star ever received in a theater. The star of this movie was a heavenly "star"—the planet Jupiter, appearing on the screen for the first time in America.

Jupiter came into view, slowly and steadily turning as if driven by an electric motor. The great red spot and other details of its surface familiar to astronomers passed across its face. One of the moons of Jupiter came on to the screen from the side, rapidly approached the planet, then its shadow appeared on the planet's surface. Finally the grayish disc of the moon itself was seen silhouetted against the bright planetary background, though not as dark as the shadow.

These motion pictures, the first of their kind ever made, are the work of Prof. W. H. Wright, of the Lick Observatory, in California, and Dr. C. E. K. Mees, director of the research laboratory of the Eastman Kodak Company. Every minute or so during the whole of one night, Dr. Wright made photograph after photograph of Jupiter with the observatory's great 36-inch reflector. Jupiter turns completely in 10 hours, but as the best results could only be obtained when the planet was fairly high in the sky, it was necessary to repeat this on several other nights. Thus every aspect of Jupiter left its record on the sensitive emulsion.

Dr. Wright then turned the negatives over to Dr. Mees, and he combined them on a motion-picture film. This was particularly clever work, for each successive image must be in exactly the same place, or else the planet will seem to wabble when shown on the screen.

At a meeting of the Royal Astronomical Society in London last summer, Dr. Wright showed these for the first time. There they proved a genuine sensation to the astronomers.

Camera Makes "Solid" Photos

A new camera that makes photographs that appear solid to the eyes and which shows different sides of the object, depending on which way one looks at the picture, was shown.

Dr. Herbert E. Ives, under whose auspices television was developed by the Bell Telephone Laboratories, described the new camera, which he designed. The pictures made with it are called "parallax panaramograms." They differ from the double stereoscopic pictures, used in the old-fashioned twin lens hand stereoscope, because no optical aid is required between the eye and the picture. Also, the old style stereograms only show the subject as it would appear to a pair of eyes in one position. With a panaramogram of a person's head, for instance, if one looks at it from directly in front, he sees a full view of the face. If the picture is looked at from the side, one side of the face is seen. It is in full stereoscopic relief all the time.

The pictures are a modification of an invention of Dr. Ives' father, Frederic E. Ives, pioneer in the invention of the halftone process of reproducing photographs. With this parallax stereogram, as it was called, two pictures were taken with two cameras separated by the distance separating the average pair of eyes. These were then combined on a glass transparency, so that the picture consists of fine vertical strips, about 200 to the inch. One strip shows part of the picture seen by the left eye, the one next to it that of the right eye, then the left eye picture again, and so on.

Another glass is firmly mounted a short distance in front of the picture and on it are alternate clear and opaque vertical strips the same width as those of the picture. When the stereogram is held at arm's length and viewed against a light, the right eye sees only the strips of the picture made with the right-hand camera. Those of the left-hand picture are covered by the dark strips. But for the left eye the case is reversed. It sees only the left-hand picture, and the right-hand one is covered. Thus the two views are combined, and the picture is seen in stereoscopic relief.

How New Camera Works

In the new method, which is the invention of Dr. C. W. Kanolt, formerly of the U. S. Bureau of Standards—although Dr. Ives designed the camera that makes them—the picture is made from different angles. The Ives camera moves along a track in front of the subject during the exposure, so that the center of the subject is always on line with the center of the plate and the center of the lens. Just in front of the plate is a glass grating of alternate vertical light and dark strips, but the clear spaces are only one-tenth the width of the dark ones. The finished picture consists of strips, but one part of each strip shows the picture from one angle, while another part shows it from another angle. A similar grating is placed over the finished transparency, and so no matter what angle the picture is viewed from the proper picture appears. Unfortunately, so far as can be foreseen, there is no practicable way of applying the method to the movies.

Medal Honors Halftone Pioneer

Frederic Eugene Ives, of Philadelphia, one of the pioneer inventors to whom the now universally used halftone process of reproducing photographs in newspapers and magazines is due, was the recipient of a new honor when the Frederic Ives Medal was presented to the Optical Society of America. The medal will be awarded by the society biennially, "for distinguished work in optics." It is founded by Dr. Herbert E. Ives, Mr. Ives' son, and television expert of the Bell Telephone Laboratories. He presented the society with the dies for the medal and an endowment for its upkeep.

Science News-Letter, November 10, 1928

Sweden has more radio sets in comparison with its population than any other European country.

A life insurance statistician says that we eat 30 per cent. more food than our grandfathers and 374 per cent. more sugar.

Devices Reduce Plane Motor Noise

Aviation

A device which will practically eliminate airplane motor noises and at the same time cause no reduction in power is being experimented with by the U. S. Navy Department. Mufflers and other equipment of this character have been frowned upon by the industry because they usually cause a loss of power and some added fire hazard.

The new device passes the exhaust gases through the vacuum created by the propeller blades, and the change in the rate of flow will greatly reduce the motor noise, it is believed. A patent has recently been issued to a commercial company on this device and with the refinements developed by Navy engineers, preliminary tests indicate that it soon may be placed in general use on Navy planes.

While other engineers are attempting to reduce the noise of aviation motors and propellers, the U. S. Bureau of Standards is trying to develop a soundproof airplane cabin. This is believed to be essential to bring planes into general use, because of the difficulty of reducing the noise created by the propeller of an airplane.

Dr. Paul Heyl, in charge of sound experiments at the bureau, believes that a light but strong cabin construction material can be developed which will allow passengers and pilots to converse in planes in flight as easily as in a parlor. This is believed to be the first time that extensive experiments have been made to produce a soundproof cabin.

Hollow-bladed airplane propellers made of a special steel are another novelty that the Navy is testing.

The Navy Department recently let a contract for six experimental propeller blades of an entirely new construction. The new propeller is of hollow chrome vanadium steel and is said to be the first one of hollow construction to stand the great strains imposed by a high-speed airplane. Efforts to develop such a blade have been made for the last ten years, but they all met with failure because no satisfactory method of welding the two sides of the propeller together could be found. By using a new process of electric welding, the new propeller was fabricated so as to be as strong as those of aluminum alloy and other materials now in general use by the Navy.

The greatest advantage of the new propeller is that it can be produced at two-thirds of the cost of present equipment. Preliminary tests with twice the normal load, recently completed on the first of the propellers, indicate that the new blade will meet all requirements and the Navy plans to advertise for bids for a large number of the hollow propellers within a few months.

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Roman Damascus Swords

Archæology

The famous Roman steel that conquered the world was at least partly of the workmanship that later came to be known by the name of Damascus. Writing in the German scientific journal *Forschungen und Fortschritte*, Prof. B. Neumann of the Institute of Technology at Breslau tells of his recently completed metallurgical researches on fragments of a number of Roman swords found buried in a German peat bed where they had lain for some 1600 years. Due to the fact that they were preserved by the damp earth from the action of air, the blades were in far better condition than other surviving specimens of Roman steel, which has either rusted to almost complete destruction or has had its temper ruined by being heated in burning buildings and then annealed by slow cooling.

The bars from which these Damascus blades were forged were made by sandwiching alternate thin layers of high and low carbon steel and then "sweating" the whole together. Left straight, the bar could be forged into a blade with a striped or ribboned effect. Twisted and then forged, it produced a blade with "V" damascening. Two twisted bars sweated together and then forged into a blade gave a "W" pattern on the finished sword. Some of the Roman blades also show a curled or "rose" pattern in the steel, but how the smiths achieved this is not yet known.

Prof. Neumann's examination of the steel samples shows that the Romans tempered only the outside of the blade, so that it would give a hard edge and point, backed up by a tough body of metal.

Science News-Letter, November 10, 1928

New Volcano

Volcanology

Vast fields of pumice and volcanic ash, floating on the surface of the south Pacific Ocean between the Fiji and Tonga groups of islands, are the first indication of a new submarine volcano. Perhaps it may finally lead to the formation of a new island, for Falcon Island, 120 miles to the southeast, appeared about a year ago, formed from similar volcanic material.

The announcement of the floating pumice was made to Science Service by Dr. Andrew Thomson, director of the Apia Observatory. A British Ship, *H. M. S. Carisso*, was the first to report it. It was first observed on the evening of October 3, about 240 miles east of Suva, Fiji. During that night patches each several miles in extent were passed, the last one sighted about 70 miles southwest of the first. On October 7 another ship, *H. M. S. Veronica*, sighted some more floating pumice about 30 miles west of this, about a mile in diameter. A sounding was made, but with the line let out for 1,200 feet no bottom was found. The next day, farther east, they encountered the largest field of all, about a half mile broad, and extending for many miles in a north and south direction.

"The position of the submarine volcano which has thrown out the immense quantity of material reported cannot be located with the information now available," said Dr. Thomson. "The surface drift of the ocean in this area is from the northeast and east, so that the probability is the volcano is eastward but not far from where the pumice was first seen at 17 degrees 25 minutes South Latitude 176 degrees 09 minutes West Longitude.

"The ocean floor between the Tongan and Fiji islands is fairly level to the west of longitude 173 with an average depth of 1,500 to 2,000 fathoms. It is an area of great seismic activity, for no less than ten violent earthquakes have occurred in seven and a half years (1913-1920) at two principal centers.

"The pumice fields lie about 75 miles south of one of these epicenters.

"A large earthquake took place on September 6 at 8:50 a. m., Greenwich time, and the locality, about 100 miles southwest of Samoa, is known to have yielded pumice on at least one previous occasion."

Science News-Letter, November 10, 1928

Who Said That First?

General Science

D. F. Fraser-Harris in *Coloured Thinking* (Brentano's):

It is also satisfactory to know, if possible, the exact date in the history of a science when a new term was introduced. For instance, the every-day word "electricity" was made up by William Gilbert, a physician and naturalist, about 1600. He derived the term from the Greek word for "amber." Or, again, how few of us know that the term "energy" in the modern sense of "capacity for doing work" was introduced as recently as 1807 by the great mathematical physicist, Thomas Young, M. D.

Let us begin with the word "gas," a word as widely used as any small word in English. It is a word without any derivation at all, it has no "root," it came from nothing other than the brain of a Belgian chemist, Jean Baptiste van Helmont, about 1630. He needed a word to express the invisible volatile substances which were neither solids nor liquids that he constantly encountered in his chemical investigations. There was no pre-existing word to designate such substances, and so van Helmont coined the word "gas"—a word without descent—a veritable etymological Melchisedek.

As a matter of fact, he coined two words at the same time—"gas" and "blas." Blas was his term for the other invisible principle, the principle of life; but whereas today we could give van Helmont (if he returned to earth) many litres of many kinds of gases, we could not materialize for him the smallest quantity of blas, for gas once the concept is now a substance, but blas the concept is the concept still.

Speaking of gases, oxygen is the one with which we are most familiar; we can carry it about compressed in cylinders, take it under the ocean or soar with it into the clouds. But it, too, was once just a concept in the mind of the great French chemist, Lavoisier, who about 1722 called it "oxy" "gine" or "the producer of acid" from a rather mistaken conception of its properties.

Our own Priestley was the first person to isolate the gas, but he named it still more unsatisfactorily "dephlogisticated air," after Stahl the German's erroneous theory of matter and heat.

Brazilian Fish for Southern Rivers

Zoology

A giant Brazilian shad weighing 200 pounds, another big fish known as "dourado," and a fresh-water species with red-gold flesh like a salmon, are among the South American fishes recommended as possibilities for fish culture in the southern United States by Dr. R. von Ihering, noted Brazilian naturalist.

The possibilities of Brazilian fresh-water fish have only begun to be realized even in Brazil, Dr. von Ihering states. Hitherto they have attracted only the attention of zoologists and local fishermen, but now economic studies are being undertaken, with interesting results.

The real prize of the Bralizian fresh waters is the "dourado," a fine black-striped gold-scaled fish that reaches a length of three feet and a weight of 60 pounds. It yields a great mass of roe as well as of remarkable meat; its egg stock frequently contains as many as two and one-half million eggs, as against a mere half-million in such familiar fish as the carp and members of the salmon family.

The fish with the salmon-colored flesh is known to the native Indians as "piracanjuba." It is rated second only to the dourado by them. One of their favorite methods of preparing it is to grind up its red flesh and make it into a thick soup or porridge mixed with tapioca.

Dr. von Ihering states that there are so many fish in the Brazilian streams that during the spring, when the runs take place, they can be netted by the boatload at the foot of every waterfall. A casting net nine feet in diameter often brings in ten or twenty large fish at a haul.

Science News-Letter, November 10, 1928

Indian Ecstatics

Anthropology

Among the southwestern Indian tribes, America has groups resembling in their mental outlook the frenzied followers of the Greek god Dionysius and other groups that compare with the calmly formal mediæval Christians. The importance of understanding the striking psychological differences between these Indians is brought to the attention of scientists by Dr. Ruth F. Benedict, of Columbia University.

The Pimas and allied wandering tribes of the southwest place a high value upon danger and horror and excesses because these abnormal states enable them to reach through to the supernatural. Peyote, datura and other drugs and intoxicants are aids in gaining the desired state of ecstacy. The Zuni, Hopi, and other pueblo tribes have none of these things. Their religious dances are formal, and unlike most Indians, they place no value on dreams or visions.

These psychological differences which affect the manners and customs of these people are not based on racial differences, Dr. Benedict said. There are some seven different pueblo groups in the region all of which have fallen under the influence of the idea of valuing normality and calm dignity. The fact that the American government has never had trouble with intoxication among these pueblo peoples is pointed out as significant.

Science News-Letter, November 10, 1928

Skill, Intelligence, Intellect

Psychology

Skill, intelligence, and intellect are considered as three distinct things by Prof. T. H. Pear, of the University of Manchester. Skill, in his definition, is the integration of well-adjusted performances. Intelligence is the capacity for planning. Intellect is the ability to express concepts in words.

Man is spectacularly unskilled at birth, but acquires from his environment most marvelous skills, for instance the ability to use language. Many animals are born skilled, able to do such things as build nests or dig burrows, but do not learn new skills to as great an extent as man does.

Creative skill, either unconscious or artistic, analytic or inventive, is rated highest by Professor Pear, while the imperfectly adapted responses of domestics and laborers rank lowest in the category of skills, with the stereotyped actions of the drilled soldier only a little higher.

Skill at work may prove easier to acquire than skill at play, despite the complexity of some tasks in industry, according to Prof. Pear. The athlete, in his opinion, overcomes only non-intellectual difficulties in mastering his sport, and never pursues undreamed-of possibilities which might lead to the development of new strokes or methods of play.

Science News-Letter, November 10, 1928

Rabbits Raise Beef Price

Ecology

A pointed suggestion as to the relation between rabbits, salt bush, and the price of beefsteak was made recently by C. P. Wilson, of the New Mexico College of Agriculture and Mechanic Arts. The destruction of valuable forage plants by rabbits, mice, and even quail and lizards, may limit their distribution and substantially reduce the productiveness of range lands. Rabbits, since they are able to crop the vegetation more closely than cattle can, are likely to be even more serious in their effects on plants. This is particularly noticeable in the case of the salt bush, locally known as chamiza, winterfat, and mesquite.

Experiments at the New Mexico Station have shown that six or seven acres of unirrigated mesa land with a good stand of mature chamiza will support a cow for a year or longer. Under protection from rabbits this plant can be successfully seeded on certain unproductive areas, even, in places, on the open desert. The presence of rabbits and other rodents, however, makes such propagation impracticable.

Similar conditions obtain in relation to winterfat and mesquite. These studies indicate that small and insignificant browse and grass feeders such as rabbits and mice, exercise an important and far-reaching effect on present-day overgrazed ranges in the Southwest, tending toward further depletion, and, in some instances, probably effectively preventing recovery. In this way they may be of economic importance to every citizen, as they tend to cut down the carrying capacity of the range lands, which means a smaller number of cattle and a higher price for beefsteak.

Science News-Letter, November 10, 1928

Not "Dumb" When Sick

Psychology

We may "feel dumb" when we are ill, but we really aren't. We are just as intelligent as ever; all that the illness does is prevent us temporarily from using our wits fully. Dr. S. Dawson of the University of Glasgow tells of the results of six years of research on the intelligence of sick children. By comparison with their brothers and sisters, and with their own records when well, he showed that even prolonged illness did not affect their intelligence quotients. Only a few diseases, such as European sleeping sickness and epilepsy, result in decreased intelligence.

Science News-Letter, November 10, 1928

Furniture for Dead Kings

Archæology

JEAN CAPART in *Lectures on Egyptian Art* (Univ. of North Carolina Press):

Let us now consider another category of documents. I shall call them the imitated articles; perhaps I ought to say the forgeries. It is a question of understanding one another about the sense of that expression. Such articles might be best compared with theatrical accessories. All the luxury, all the splendor of our operatic kings is meant to create illusion while incurring the least possible expense in the staging. I have said before that one of the objects of the Egyptians was to give the deceased the happy illusion that he had taken away with him all his goods and chattels. But, side by side with the well-being of the dead, there existed, in conflict with it, the cupidity of the living, desirous to keep as much as possible of the inheritance. Wonders have been worked to conciliate fear of the departed and filial piety with the set purpose of going to the least possible expense. Why put golden vases, inlaid with colored stones, in the temple of King Neferirkere's pyramid if one is certain that the departed Pharaoh will be just as well satisfied with wooden vases inlaid with enamel? . . .

The pieces of furniture found in the tombs are often of extraordinary fragility and some of them could never have resisted usage. Such is the case of a chair found in Senedjem's tomb; it is made of white wood, but it has been painted all over as if it were a richly inlaid piece of furniture with a back made of panels. The seat of the original must have been covered with tapestry of various colours, but here the workmen simply imitated it with coarse material covered with a layer of plaster on which a pattern with bunches of grapes had been painted. The same may be said of a small chest belonging to this tomb. It is made of common wood, but its painting represents marquetry and woods of various kinds inlaid with ivory.

We may now wonder whether many of the pieces of furniture found in Tutankhamon's tomb are only funerary copies. These magnificent golden chariots, for instance, are they the very chariots used by the king for driving, hunting, or going to war? I think I may bring forward an argument to support the theory that they are only facsimiles. An ornament of the pole, composed of a hawk bearing the solar disc on its head, has been found. We know it is the figure of a divinity. What is exceptional in this instance is that the disc is not plain but covered with heiroglyphics forming the name of the king. I think it is a perfect illustration of the usual description by the Egyptians of the death of their kings: "His Majesty has flown to heaven and has united himself with the solar disk; the divine members have been absorbed by him who had created them." Such a symbol would not find its place on the chariot of a living king.

Science News-Letter, November 10, 1928

The Mystery of Life

Biology

PROFFESSOR F. G DONNAN, in an address before the British Association for the Advancement of Science:

Amidst the vast cosmos disclosed to the mind of man, our sun winds its modest way, an unimportant star, old in years and approaching death. Once upon a time, so the astronomers tell us, its surface was rippled by the gravitational pull of a passing star, and the ripples becoming waves broke and splashed off. Some drops of this glowing spray, held by the sun's attraction in revolving orbits, cooled down and became the planets of our solar system. Our own planet, the earth, gradually acquired a solid crust. Then the water vapour in its atmosphere began to condense, and produced oceans, lakes, and rivers, as the temperature sank. It is probably at least a thousand million years since the earth acquired a solid crust of rock. During that period living beings, plants and animals, have appeared, and, as the story of the rocks tells us, have developed by degrees from small and lowly ancestors. The last product of this development is the mind of man. What a strange story!

Science News-Letter, November 10, 1928

Animal Graveyards

Zoology

Travelers in the Andean highlands of South America have often reported areas in which the two types of camels, the llamas and guanacos, repair when death approaches, there to leave their mortal parts, often undisturbed by predatory animals. These "dying-places" are said to be desolate places which none but the sick and the aged seek out.

Fossil animals of considerable antiquity are thought by scientists to have had a similar custom. In the sides of a large hill in northwestern Nebraska many skeletons of a small, graceful camel, slightly larger than a greyhound, have been found in such situations as to suggest an ancient practice of the custom of seeking out "dying places" far back in the history of the camels. The fossil animals, called *Stenomylus,* lie extended, in groups and singly, with no part of the body disturbed. Their slender leg bones are about as slender and as fragile as glass tubing. There in the sand, long since converted into rock, these early camels lie in precisely the same attitudes which they had assumed at death in a time when the races of mammals were young. Disease and injury have played no part in the mortality of these ancient camels who had voluntarily selected this spot as their last resting-place.

Science News-Letter, November 10, 1928

Eugenics Society Prizes

Eugenics

Four prizes, two for American authors and two for European authors, are offered by the Eugenics Research Association for the best essays written on "A comparison of both the crude birthrate, the birthrate per 1,000 females 15 to 45 years of age and the 'vital index' of Nordic and non-Nordic peoples" in, respectively, the Americas and Europe. Details may be obtained from the Eugenics Research Association, Cold Spring Harbor, Long Island, New York.

Science News-Letter, November 10, 1928

The Hawaiian Islands celebrated the 150th anniversary of their discovery this year.

Government geologists are finding airplanes useful to carry them into the Alaskan wilderness.

New Hampshire is taking steps to drain its coast marshes, where eleven species of mosquitoes are found.

Nature Ramblings

By Frank Thone

Natural History

Shellbark Hickory

Those of us who have or can remember a rural or semi-rural boyhood background will recall the shellbark or shagbark hickory with mixed emotions. It bears about the finest nuts of any of our native trees—but it also bears the limberest and toughest switches. And as for sawing up a cord of hickory stovewood . . .

Most of us, however, will remember the nuts better than we do the switches, and in most places hickory wood has become much too precious to be sawed up and burned. As a matter of fact, the present lack of hickory trees was one of the few things that ever turned Henry Ford aside from an announced purpose. Mr. Ford a few years ago tried to buy up enough woodland to supply wheelspokes for his vast family of small cars, but in the end he had to give it up and take to wire spokes. The hickories have simply been cut away to such an extent that they can no longer supply spokewood.

The same qualities that made the hickory switch dreaded in the little red schoolhouse days made hickory wood desirable for spokes, tool handles, and a host of similar uses. It combines great resilience with great strength, and can have a load thrust upon it with a jar many thousands of times before it finally begins to loosen up and weaken. The American Indians, lacking the yew wood that made the bows of Old England supreme among pre-gunpowder weapons, used hickory a good deal in making their bows.

The shagbark or shellbark hickory got its name from its habit of splitting and peeling off its outer bark in long, thin chunks. The ground under an old tree is frequently littered like a tanyard with these rags of its discarded garments.

Science News-Letter, November 10, 1928

"Carriers" for Colds

Hygiene

When colds "run in the family" it is no sign that the family is constitutionally subject to colds. It may be that some member of the family is acting as a carrier, just as some people are typhoid carriers, suggests Dr. P. Watson-Williams in a report to the *Practitioner* of observations made on ninety consecutive patients. Sometimes one child is known for starting colds among his brothers and sisters. This same child may become immune to colds himself but still harbor cold germs and be able to pass them on to others. If he grows up and has a family, he may still be starting colds in the family, although they are no longer traced to him.

The reason for this may be an unsuspected infection of his nasal sinuses, the honey-comb structures back of the nose and eyes. This same infection may be the reason for some children growing a second set of adenoids, when the first ones have been removed with the tonsils, Dr. Watson-Williams thinks.

Dr. Watson-Williams also reports a tendency for families that are prone to colds to have infections in the abdomen, for instance in appendix and gall bladder. The body cells that fight disease germs are weakened by resisting the germs always present in nose and throat and become an easy prey to those germs that find their way to the abdomen.

Science News-Letter, November 10, 1928

Trees Without Soil in Cuba

Botany

Huge trees growing without any visible means of support are a striking feature of the great Zapata Swamp of southern Cuba. This swamp, nearly 1,800 square miles in extent, includes an area of limestone that is filled with holes and covered with a variety of tropical trees. Silk-cotton trees four feet in diameter, big mahoganies, and many other kinds are found growing on this limestone area where not so much as a single spoonful of soil could be gathered from an acre. The trees make their start in small pockets and holes in the limestone where collections of leaves and slight accumulations of disintegrated rock furnish them with cover for growth. The roots stray about over the surface of the rock in search of food, finally plunging through holes to find sustenance in soil hidden deeply in the cavernous recesses of the coral stone.

Science News-Letter, November 10, 1928

When Doctors Disagree

Psychology

ROBERT S. ELLIS in *The Psychology of Individual Differences* (Appleton):

The relatively untrained student is often perplexed by the conflict of opinion among different writers or teachers. What view shall he accept? There is no infallible guide here, but it would seem wiser and safer, in general, to accept the views of those who have made the most extensive and intensive study of a subject and have had the widest experience in dealing with it. Biologists probably know more about evolution than the members of state legislatures know about it. Men who have devoted their lives to the scientific study of heredity probably know more about it than philosophers and sociologists and social psychologists know about it. Psychologists who have spent a good many years working with mental tests probably know more about the tests and what they measure than is known by the layman or by their brother psychologists who have not worked especially in that field. Generally it is wise to go to a physician when ill or to a lawyer when in legal difficulties. The beginning student will do well to keep this principle in mind when attempting to decide between conflicting views. And when, as frequently happens, the experts in a particular field do not agree, it is wisest not to accept any view on the subject too implicitly. New discoveries are constantly throwing new light on old facts and so are forcing the modification of previous conceptions. The faster a subject is growing the more rapidly these changes occur. Growth in scientific knowledge is not and cannot be simply by a process of addition. Modifications of the existing structure are just as essential as are additions.

Science News-Letter, November 10, 1928

Monkeys have no facial muscles with which they can smile.

FIRST GLANCES AT NEW BOOKS

THE AUTHENTIC LITERATURE OF ISRAEL, Volume II—Elizabeth Czarnomska—*Macmillan* ($5). The organization of Bible literature into its present form has been a complex proceeding, and few people are familiar with the original material that was brought together and edited to make the well known book. In this source book, old documents are "freed from the disarrangements, expansions, and comments of early native editors." This volume deals with the period from the exile to the recovery of Israel's independence. Poems, such as the Psalms, and the old prophecies and classic narratives are presented as nearly as possible in the form in which they were known to the people of Israel.

History—Ethnology
Science News-Letter, November 10, 1928

COLLOID CHEMISTRY—The Svedberg—*Chemical Catalog* ($5.50). In the second edition of this work in the publishers' monograph series of the American Chemical Society, the advances in colloid chemistry made in the last four years are included. Some of these are the new applications of X-rays to the subject, new technique in ultramicroscopy and improved methods for the measurement of diffusion and cataphoresis.

Chemistry
Science News-Letter, November 10, 1928

AMERICAN CHEMISTRY — Harrison Hale—*Van Nostrand* ($2.50). Fourteen chapters, covering all branches of chemistry from food and textiles to acids and coal tar dyes, bring to the reader the importance of chemistry in America.

Chemistry
Science News-Letter, November 10, 1928

GLYCEROL AND THE GLYCOLS — James W. Lawrie—*Chemical Catalog* ($9.50). In this latest of the American Chemical Society's chemical monographs, the subject of glycerol and its related compounds, the glycols, is exhaustively treated for the first time. In view of the growing importance of these compounds in chemical industry, the book will be most warmly received by chemists.

Chemistry
Science News-Letter, November 10, 1928

LABORATORY MANUAL OF HIGH SCHOOL CHEMISTRY—G. H. Bruce—*World Book Co.* ($.76). Terse text and clear line cuts make this little book effective.

Chemistry
Science News-Letter, November 10, 1928

BIRDS OF THE OCEAN—W. B. Alexander—*Putnam's* ($3.50). For the student or sojourner by the shore and for the voyager at sea, the bright, swift birds that live by fishing have always possessed a fascination of their own. Here is a small and conveniently shaped book that will give complete information about most of them and still not weigh down the pocket.

Ornithology
Science News-Letter, November 10, 1928

FIELD BOOK OF BIRDS OF THE PANAMA CANAL ZONE—Bertha Bement Sturgis—*Putnam's* ($3.50). The popularity of Panama increases, both as a wintering place for the naturalist and bird lover and as an easily obtained taste of the tropics for the casual traveler. For all such, this book will be most valuable in the adventure of getting acquainted with the strange birds that flash through the treetops.

Ornithology
Science News-Letter, November 10, 1928

THE TROPICAL CROPS—O. W. Barrett—*Macmillan* ($4). The increasing population of the earth is looking increasingly toward the tropics for its food and fiber. This compact book will serve a very useful purpose in giving agricultural students a really well-rounded education and in bringing the information of all interested persons up to date.

Agriculture
Science News-Letter, November 10, 1928

THE LEGAL STATUS OF AGRICULTURAL COOPERATION—E. G. Nourse—*Macmillan* ($3). Appearing when much legislation is pending for the encouragement and regulation of cooperatives, this book is most timely. Some one should see that a copy is placed on the desk of every member of Congress and every state legislator.

Agriculture
Science News-Letter, November 10, 1928

BIBLIOGRAPHY OF CRYSTAL STRUCTURE—Jared Kirtland Morse—*Univ. of Chicago* ($3). In addition to a list of the important papers and books on crystal structure since Laue's work in 1912, this book contains six new papers by the author, reporting work of the Crystal Structure Laboratory at the University of Chicago.

Physics
Science News-Letter, November 10, 1928

SCIENCE IN SEARCH OF GOD—Kirtley Mather—*Holt* ($2). "Canst thou by searching find out God?" Prof. Mather believes that science can help man at least to learn something of His attributes, and here sets forth the reasons for his belief.

Philosophy
Science News-Letter, November 10, 1928

THE ORGANISMAL CONCEPTION—William E. Ritter and Edna W. Bailey—*University of California Press* ($.65). Dr. Ritter is one of the leaders in the movement for a new philosophy of science which is being advanced in various fields with the aim of counteracting the tendency of extreme specialization by emphasizing the unity of nature. This pamphlet brings into a compass of 50 pages the main theses of his philosophy as detailed in his "Unity of the Organism" and "The Natural History of Our Conduct."

Philosophy
Science News-Letter, November 10, 1928

THE ALCHEMY OF LIGHT AND COLOR—Oliver L. Reiser — *Norton* ($1). An interesting discussion of the relations of rays to color perception, leading up to a new theory of soul and body, which the author, a professor of philosophy in the University of Pittsburgh, promises to develop later. According to this view, as far as here foreshadowed, consciousness acts as the overtones or harmony in music to the fundamental notes furnished by the sense stimuli.

Philosophy
Science News-Letter, November 10, 1928

EXPLORING YOUR MIND—Albert Edward Wiggam — *Bobbs-Merrill* ($3.50). Interviews with well known psychologists on special subjects that they know best. Mr. Wiggam is a skilful interviewer, and his conversations with Thorndike, Cattell, Terman, Seashore, Laird, Hartshorne, and others bring the reader into close touch with the progress of psychological science and show the reader what this knowledge means to him.

Psychology
Science News-Letter, November 10, 1928

ALPHABET OF IDEAS (Ro-English Dictionary)—Edward Powell Foster—*Roia* ($1). A small volume containing a comprehensive list of words in the artificial language called Ro and their English equivalents.

Linguistics
Science News-Letter, November 10, 1928

Glimpses at New Books—*Continued*

LECTURES ON EGYPTIAN ART—Jean Capart—*Univ. of North Carolina Press* ($5). A reader who knows little about Egyptian life and art will find something new and surprising on practically every page of this well-written volume. Profuse illustrations from tombs, temples, and museums bring a panorama of Egypt's best art remains before the reader's eye and as he reads he begins to see for himself that there is more to these carvings and paintings than the stiff and stony mystery that most people casually see in them. Along with its readable quality and its lack of technical language the book expertly covers a great field of specialized knowledge.

Archæology
Science News-Letter, November 10, 1928

MORE COLOR FOR YOU—Jane Betsey Welling—*Abbott Educational Co.* ($1.50). A text book dealing with the most attractive of art problems and the one most useful in every-day life. The book seems designed chiefly for teachers of grade schools, though the author aims also to interest craft workers and others who want to know more about the application of color principles. Many ingenious and practical devices for presenting facts about color to children are described and the experimental method is advocated throughout, so that the children gain their knowledge actively.

Education—Art
Science News-Letter, November 10, 1928

COLOURED THINKING—D. F. Fraser-Harris—*Brentano's* ($2.50). Pleasant essays, easily read and at the same time informative. The book title points only to the first chapter. From there the reader is given some ideas on "Childishness in Adult Life" and later on he arrives at particularly interesting chapters on "Poetry and Science" and "Biology in Shakespeare." The essayist is an English professor.

General Science
Science News-Letter, November 10, 1928

THE CRETACEOUS AND TERTIARY OF SOUTHERN TEXAS AND NORTHERN MEXICO—Emil Böse and O. A. Cavins; and CRETACEOUS AMMONITES FROM TEXAS AND NORTHERN MEXICO—Emil Böse—*Univ. of Texas.* Of interest to geologists and paleontologists.

Geology—Paleontology
Science News-Letter, November 10, 1928

MEXICO AND ITS HERITAGE—Ernest Gruening—*Century* ($6). "To understand Mexico," writes this author wisely, "one must think in terms of other centuries as well as of this." Following this method of probing into origins and comparing past and present situations, he succeeds in making the emotions and the struggles of modern Mexico seem reasonable and understandable. Special stress is laid on politics, religion, agrarian problems, and international relations. Plentiful citations of reference sources are a valuable feature.

Sociology—Ethnology
Science News-Letter, November 10, 1928

KNOCK WOOD!—Daniel Deerforth—*Brentano's* ($2.50). The sub-title of this book, "Superstition Through the Ages," suggests a scientific work on superstition. But as the reader progresses, he finds that the author's chief interest is in collecting cases of stupidity from the Christian church—particularly from its fundamentalist followers, ancient, medieval, and modern. The material is mostly from second hand sources, largely from White's "Warfare" and it is handled in a superficial and caustic manner.

Ethnology
Science News-Letter, November 10, 1928

AN INTRODUCTION TO THE STUDY OF SOCIETY—Frank Hamilton Hankins—*Macmillan* ($4). A broad, dynamic view of sociology, starting out with the origin and antiquity of man, and keeping before the student the idea of evolution in the various phases of social life. The book gives less space than most sociology texts to the details of housing, sanitation, and community welfare. It gives chief room, instead, to facts of genetics, biology, anthropology, geography, and ethnology, which have shaped groups of people into their present mould.

Sociology
Science News-Letter, November 10, 1928

"OLD" JIM BRIDGER—Edwin L. Sabin—*Crowell* ($2). An adventure tale for boys that manages to give a fairly straight account of the exploration of the Yellowstone country and the discovery of the Great Salt Lake. The description of the state of mind of the untutored Jim Bridger as he threaded his way among the geysers and hot springs is an interesting and convincing psychological study.

Fiction
Science News-Letter, November 10, 1928

Minnesota has nearly 250,000 acres of public land still unappropriated, chiefly because the land is in lake regions and is low and swampy or subject to overflow.

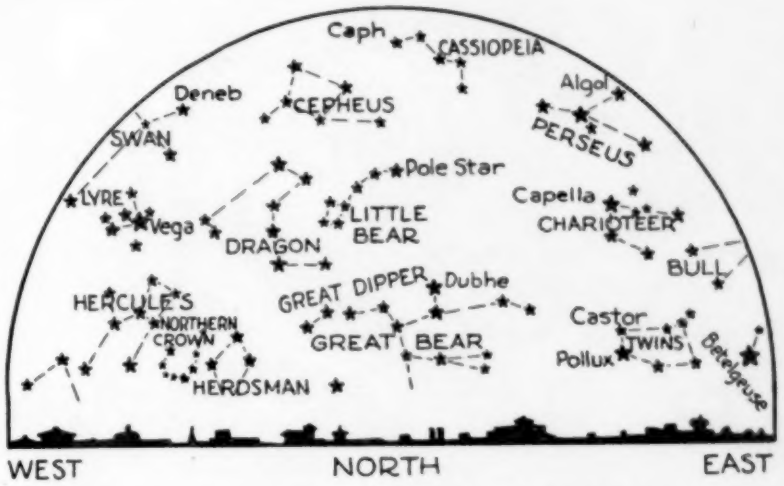
Moon Eclipse Is Feature of November

Astronomy

By James Stokley

To see the most interesting astronomical event of November, 1928, one will have to stay up a little later than the evening—except in the western part of the country. This will be during the night of Monday, November 26. At that time the moon, in its monthly trip around its orbit, will get into the shadow of the earth. The moon will be in the full phase at the time, as it must always be when it is eclipsed, and so a person who watches it that night will see the earthly shadow gradually cover its face. When it is all covered, the moon will assume a coppery-red color. Then the shadow will pass, and before sunrise, and moonset, the moon will again be shining with its accustomed brilliance.

In its most general meaning, an eclipse is caused whenever one astronomical body gets directly between two others. However, when the astronomer speaks of an eclipse, he usually refers to the moon coming between the earth and the sun, thus causing a solar eclipse; or to the earth getting between the sun and the moon. The latter case is an eclipse of the moon. In the first instance, the moon's shadow falls on the earth, in the latter it is the earth's shadow that falls on the moon. Because the earth is so much larger than the moon, its shadow is able to engulf completely the moon. When the moon's shadow falls on the earth, however, its "umbra," or darkest portion, is not more than a couple of hundred miles in diameter. Therefore, the sun is seen eclipsed in a very restricted part of the earth, though solar eclipses happen oftener than those of the moon. When the moon is eclipsed, it can be seen from any place in the darkness of night at the time.



On the night of the 26th, or early in the morning of the 27th, the moon thus enters the shadow of the earth. The time table is like this, in eastern standard time:

1:25 a. m.—Moon enters penumbra, or outer part of earth's shadow. No noticeable effect.

2:24 a. m.—Moon enters umbra, or inner part of shadow. Soon afterwards the southeast edge of the moon begins to darken, and the shadow gradually covers the moon.

3:33 a. m.—Moon completely engulfed in shadow. Beginning of total phase. Probably appears of coppery red color.

4:29 a. m.—End of total phase. Moon begins to emerge from umbra, soon afterwards the northeast edge begins to brighten.

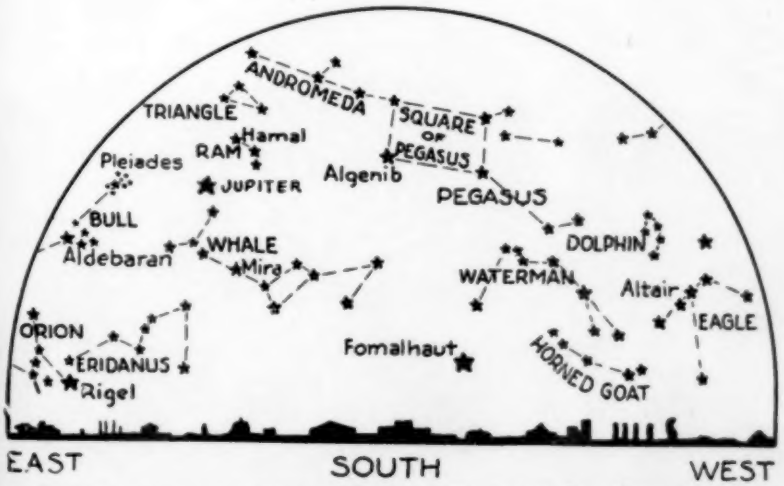
5:39 a. m.—Moon leaves umbra completely, and appears almost as bright as ordinarily.

6:38 a. m.—End of eclipse. Moon has completely emerged from the shadow.

The difference between the umbra and penumbra is a result of the fact that the sun is not a point source of light, but has an appreciable area. Hold up your hand at noon so that the shadow falls on a smooth surface on the ground. You will notice that the shadow is not sharp. In the center is a dark area (the umbra) and around it is a region in which the darkness gradually shades off (the penumbra). An ant on the ground in the umbra would not be able to see the sun at all, though in the penumbra it would be able to see part of the solar disc, the hand hiding the rest. At night, with an arc light, however, the shadow would be much sharper. This is because the light of the arc is practically concentrated at a point.

The same thing occurs during an eclipse. When the moon enters the penumbra, a person on the moon, if he existed (which he probably doesn't) would see the sun partly covered by the earth. As the eclipse progressed, more and more of the sun would be covered, but, as long as any of it was still visible, the sun would still be very bright. Then, as the last shred of sun was covered, it would suddenly get much darker. That is the reason that the edge of the umbra is so clear on the moon's surface, and the curved edge of the earth's shadow can be seen.

So far as scientific value is concerned, an eclipse of the moon is not very important, probably at most observatories in the United States, if the weather is clear, (*Turn to next page*)



HOLD THESE MAPS IN FRONT OF YOU. The upper then shows you the northern and the lower the southern sky as it appears on November evenings

Moon Eclipse November Feature—*Continued*

the astronomers will watch it through their telescopes, make a record of the times at which the different stages occur, take photographs of the eclipsed moon, or perhaps make photometric measurements of the brightness. But these will all be routine observations, and if cloudy weather intervenes, there will not be a great deal of disappointment. For the layman, however, and, in fact, for the astronomer as well, the eclipse is an interesting spectacle. The color of the eclipsed moon is always somewhat uncertain in advance, for it depends in a measure upon the weather conditions on the earth. It is probably the only way in which terrestrial conditions ever produce any apparent effect on another astronomical body.

The cause of the red eclipsed moon is the same as the cause of the red sunset. At noon the light from the sun is white, but at sunset the light has to pass through a much greater layer of air, and the blue rays are more completely absorbed than the red ones. The latter get through to our eyes, and so the setting sun often looks red. It is also a fact that we can see the sun after it has set. The atmosphere acts like a prism and bends the rays of light around the horizon. If you place a coin in the bottom of a shallow pan, place your eye at such a level that the edge just obscures the coin, and then pour in water, the coin will again be visible. This is because of the bending of the light rays as they pass from the water to the air. The same sort of thing happens with the air. If the earth were airless, and we watched the sun set, then suddenly poured on a layer of atmosphere, the sun would appear again.

As a result of this atmosphere, the shadow, even the umbra, of the earth is not completely dark. The atmosphere bends some of the rays of sunlight around and into the otherwise dark shadow. As these rays pass through twice as much air as even light from the setting sun, they are even more ruddy, and so the eclipsed moon, when illuminated by these feeble rays, appears coppery red. But if there are widespread clouds around the earth along the line at which the sun is either rising or setting, they absorb much of the light. Sometimes, therefore, the light reaching the totally eclipsed moon is much less than at others, and so eclipses have been recorded when the moon has almost completely disappeared. Such an eclipse, however, is quite rare.

The 27th, however, does not bring the only eclipse of the month. The moon makes one of its orbital trips around the earth in 28 days, so that 14 days before or after an eclipse of the moon, its own shadow might fall on the earth and we would have a sun eclipse, if the conditions are right. Last spring this occurred both before and after. There was a sun eclipse on May 19, one of the moon one June 3 and another of the sun on June 17, though both of the solar eclipses were devoid of scientific value. This month a sun eclipse occurs on November 12, but it will not be seen at all from the United States. To people in Europe, however, the sun will be partly covered, but at no place on the earth's surface will it be completely obscured. On this account, it is also without scientific importance. Fourteen days after the 27th the moon's shadow completely misses the earth, and there will not be another eclipse until May 9, 1929. Then the sun will be totally eclipsed along a band crossing Sumatra, the Malay Peninsula and some of the southern of the Philippine Islands. This will be one of the most favorable eclipses for many years, and astronomers from all parts of the world will flock to the path of totality to see it. But not until April 13, 1930, will there be another eclipse of the moon.

The most conspicuous planet during November is Jupiter, seen in the southeast during the evening, as shown on the map. Its great brightness, and steady light, makes it easy to identify. But early in the evening, for an hour or so after sunset, a bright planet is seen in the southwest. This is Venus, and in the coming months it will continue to get brighter and higher in the sky. Saturn, which was so prominent during the summer, is still visible in the western evening sky, but it is quite low and not nearly as bright as either Jupiter or Venus. Mars is visible later in the night. About midnight it is seen in the eastern sky, its brilliant red color identifying it.

The stars in November are shown on the maps. One of the most noticeable groups is the Great Square in Pegasus, in the south. This is easy to locate, and from it the amateur star-gazer can easily find his way to the other constellations. Cygnus the swan, is high in the west, and nearby are Aquila, the eagle, and Lyra, the lyre. Over to the east appears Taurus, the bull, in which can be seen the brilliant red Aldebaran, and the two loose clusters of the Pleiades and the Hyades. Aldebaran itself is among the latter.

With the mention of the Leonid meteor shower, the description of the principal astronomical events of November, 1928, will be completed. This comes about the 15th. If you watch the northeastern sky during that evening or the evening of the 14th, the night before, you will probably see a few streaks of light, or shooting stars, as they are commonly called, all seeming to emanate from a point below the horizon. At midnight the constellation of Leo, the lion, rises and then the meteors will seem to come from a point in the familiar "Sickle" of this group. Then they will become more numerous. Actually these meteors are moving along parallel paths, and at this time of year the earth gets in their way, so a number come into our atmosphere. Here the friction heats them to incandescence and they vanish in a flash of light. The effect of their seeming to come from a point in Leo, and which gives them their name, is merely one of perspective, as the walls of a long corridor seem to vanish to a point in the distance.

Meteors consist mostly of crystalline rock, judging by the meteorites, the samples that sometimes reach the ground, and may weigh many tons, though usually they are much smaller. Iron meteors also occur, while still others consist of iron alloyed with nickel and cobalt. Sometimes they are a mixture of rock and iron. There is good evidence that the meteors of certain groups, at least, are remains of comets of former times.

On page 284 of this issue of the SCIENCE NEWS-LETTER are given full directions for observing the Leonid meteors. By watching for them, and carefully recording your results, you can help the astronomers in their study of these visitors from outer space. There is an association of amateur astronomers, the American Meteor Society, that makes a special study of them. As no telescopic aid is required, it is work particularly adapted for amateur cooperation.